MRP Properties Company, LLC
Post Office Box 696000 • San Antonio, Texas 78269-6000 • Telephone (210) 345-2000

Brenda B. Epperson
Manager
Environmental Liability & Remediation Management

July 15, 2014

Mark Vishnefske
Environmental Scientist III
Bureau of Waste Management
Kansas Department of Health and Environment
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Re: **Response to KDHE Comments from May 8, 2014 on the 2013 Annual Groundwater Monitoring Report**
MRP Properties Company, LLC – Arkansas City, Kansas
EPA ID No. KSD087418695
VIA FEDERAL EXPRESS TRK#: 7706 1086 2378

Dear Mr. Vishnefske,

MRP Properties Company, LLC (MRP) has reviewed the Kansas Department of Health and Environment (KDHE) letter dated May 8, 2014 containing the comments on the 2013 Annual Groundwater Monitoring Report and follow-up telephone conference call on June 12, 2014. The purpose of the conference call was to discuss Comment 6. MRP's response to the KDHE comments is provided in this letter. KDHE's comments are listed below in italics followed by MRP's response.

1. *The reference to K.A.R. 2S-3l- l in Section 1.3 on Page 1-2 is invalid. K.A.R. 28-31-1 has been revoked. Please revise Section 1.3 to state "....40 CFR 264.100, as incorporated by reference in K.A.R. 28-31-264, and the RCRA Permit...".*

Response:
The text in the document has been revised. Replacement pages are attached to this letter.

2. *Section 2.6.2 on Page 2-5 incorrectly states that BTEX constituents detected in monitoring wells WN-7B, WN- 8B, and MW-6 did not exceed any groundwater protection standard (GWPS) values. Table 3 shows detected benzene concentrations ranged from 6.5 µg/L to 200 µg/L which exceeds the GWPS of 5 µg/L. Please revise Section 2.6.2 to state that detected benzene concentrations in the above monitoring wells exceeded GWPS values.*

Response:
The text in Section 2.6.2 has been revised. Replacement pages are attached to this letter.

3. *The discussion of analytical results from the Upgradient Boundary monitoring wells in Section 2.6.5 on Page 2-8 states that low levels of several SVOCs and PAHs were detected in monitoring well RFI2-12C, but offers no explanation for contamination at this well which is near the property line and upgradient of all known groundwater contamination. Please offer a plausible explanation for the contamination detected in this well.*

Response:
Discussion with a former employee indicated this area was used in the past for fire training. Diesel fuel was ignited in the fire training exercises. Small quantities of diesel fuel were likely not consumed during the fire training leaving behind diesel fuel in the shallow soils. The constituents detected in the groundwater at monitor well RFI2-12C appear consistent with a diesel source. This area is within solid waste management unit (SWMU-20).

4. *The discussion of the analytical results from the Walnut River Boundary monitoring wells in Section 2.6.5 on Page 2-8 does not mention that 1-methylnaphthalene and 2-methylnaphthalene were detected in monitoring well RFI2-1C above the GWPS. In addition, the discussion incorrectly states that there were no other exceedances of GWPS even though arsenic was detected in RFI2-7C at 16 µg/L and RFI2-8C at 14 µg/L which exceed the GWPS of 10 µg/L. The detection of arsenic above GWPS in these monitoring wells is of special concern because of their proximity to the Walnut River and direction of groundwater flow. Further assessment may be needed if arsenic concentrations remain at levels exceeding GWPS in monitoring wells RFI2-7C and RFI2-8C. Please revise Section 2.6.5 to note the GWPS exceedances in monitoring wells RFI2-1C, RFI2-7C, and RFI2-8C.*

Response:
The text in Section 2.6.5 has been revised. Replacement pages are attached to this letter.

5. *The first paragraph in Section 4.0 on Page 4-1 incorrectly states that there are currently two RCRA-permitted corrective action remedial systems operating at the facility. The third paragraph in this section refers to performance of the LTU corrective action system which was discontinued in 2012. Please review and update Section 4.0.*

Response:
The text in Section 4.0, paragraphs 1, 3, and 4 has been revised. A replacement page is attached to this letter.

6. *Groundwater containment in the Waste Management Area (WMA) is achieved through pumping of nine groundwater recovery wells to create a reverse groundwater hydraulic gradient between the WMA and the Walnut River. Adequacy of the recovery system for groundwater containment is evaluated by monitoring of reverse groundwater gradients observed at four pairs of strategically placed monitoring wells. Based on the available data, KDHE has a high level of confidence in the current assessment of groundwater containment in the WMA.*

   Groundwater containment for areas of the facility outside of the WMA is dependent upon a reverse groundwater hydraulic gradient created by a combination of groundwater pumping at the groundwater recovery wells in the WMA and groundwater pumping at ten product recovery wells in the northern section of the facility. Groundwater pumping rates at the product recovery wells are based on maximization of free product recovery with incidental groundwater recovery. Evaluation of groundwater containment in these areas is based on potentiometric surface contours created from static water level data obtained from interior monitoring wells and a limited number of monitoring wells near the river that are referred to as the Walnut River Boundary wells. To better understand groundwater/surface water relationship in proximity to the refinery site, particularly in the northern part of the facility, KDHE requests MRP to determine river elevation in relation to nearby groundwater elevation at three or four locations on the Walnut River immediately adjacent to the facility boundary. In case there is a need to assess

temporal variations in river elevation in relation to nearby groundwater elevation, it would be important to devise an approach that will ensure reasonable comparability of the individual datasets. This information should supplement data from the upstream USGS river gauge at Arkansas City to determine whether the river is gaining or losing over time. These elevations can be used to better assess any reverse gradients between the aquifer and the river and increase the level of confidence in the adequacy of groundwater containment for groundwater north of the WMA. Depending on the results of this assessment, it may also be beneficial to consider installation of additional monitoring wells or piezometers at optimized locations.

Response:
Pursuant to the conference call held between MRP, MWH, and KDHE on June 12, 2014, MRP will install four monitor wells along the boundary with the Walnut River. Two of the monitor wells will be installed between the RFI2-2A/C/D well cluster and the RFI2-3A/C/D well cluster and two monitor wells will be installed between the RFI2-3A/C/D well cluster and the RFI2-4A/B/C well cluster. The planned monitor well locations are shown on the attached location map.

The purpose of these four monitor wells is to provide additional definition of the groundwater potentiometric surface at the north east portion of the site to aid in assessing the groundwater gradient and flow direction in the vicinity of the Walnut River. The monitor wells will be installed according to the procedures described in Section 3.1 of Addendum No. 1 to the RCRA Permit Renewal Appendix P Groundwater Sampling and Analysis Plan. As an alternative to the investigation derived waste procedure described in Section 3.1.3, MRP may characterize the soil according to the special waste disposal facility testing requirements for offsite disposal.

If you have any questions or comments regarding the response to these comments, please contact me at 210/345-4619 or Jay Mednick, MWH at 303/291-2262.

Sincerely,

BB Epperson

Brenda B. Epperson

Enclosures:
cc:
Brad Roberts, EPA Region 7/AWMD/WRAP
Kent Biggerstaff – MRP Properties Company, LLC
Jay Mednick – MWH

2013 Annual Groundwater Monitoring Report

Arkansas City, Kansas

Permit Number: KSD087418695

Prepared for:

MRP Properties Company, LLC
1400 South M Street
Arkansas City, Kansas 67005

Prepared By:

MWH Americas, Inc.
1801 California Street, Suite 2900
Denver, Colorado 80202

February 28, 2014
Revised July 14, 2014

PROJECT NUMBER: 10502425

#3A Aerated Lagoon, and the Land Treatment Unit (LTU). In accordance with 40 CFR 264.95(b)(2) and 264.97(b), the four hazardous waste management units have been incorporated into one Waste Management Area (WMA) for the purpose of groundwater monitoring and corrective action. The WMA, as shown on Figure 2, is defined as the area encompassing the Land Treatment Unit to the southwest and the #1 Surface Impoundment, #2 Surface Impoundment, and #3A Aerated Lagoon to the northeast extending to the Walnut River.

1.3 Corrective Action Program

The groundwater corrective action program for the WMA is designed to meet the applicable requirements of 40 CFR 264.100, as incorporated by reference in K.A.R. 28-31-264~~1~~, and the RCRA Permit until corrective action requirements contained in 40 CFR Part 264 Subpart F and the Permit have been satisfied. The corrective action program for the WMA consists of a program to ensure that groundwater quality will achieve compliance with the groundwater protection standard (GWPS) established in Attachment B of the Part I Permit. The groundwater corrective action consists of continuous operation of the groundwater containment and recovery system at the downgradient boundary of the WMA. The groundwater recovery system will continue to operate until the groundwater protection standard (GWPS) values established in Permit Condition IV.B. have not been exceeded for a period of three consecutive years at and beyond the point of compliance [40 CFR 264.100 (c)].

The groundwater corrective action system consists of nine recovery wells (RW-35 through RW-75). The recovery wells are used to achieve a groundwater gradient reversal to contain the groundwater and prevent releases to the Walnut River. The recovery wells pump the groundwater to the facility's wastewater treatment system (i.e., bioreactor tanks and oxidation ponds) for treatment prior to discharge to the Walnut River under Kansas Water Pollution Control (KWPC) permit number I-WA18-PO02 (KDHE, 2011).

This report consists of five sections and four appendices (Appendices A through D). This introduction is Section 1. Section 2 presents a description of the groundwater monitoring network and the monitoring parameters, sampling protocols and laboratory results for the Part I and Part II permit related monitoring. Section 3 provides an evaluation of the effectiveness of the corrective action. Section 4 provides an evaluation of the adequacy and efficiency of the corrective action. Section 5 of the report contains a list of references used in the report.

Benzene, naphthalene, and 1-methylnapthalene concentration data are presented on concentration isopleth maps (Figures 7 through 9). Additionally, representative constituents were selected for presentation on the concentration posting maps, Figures 10 and 11. Ethylbenzene and total xylenes did not exceed GWPS values in any of the groundwater samples collected during the two 2013 sampling events, but they were included on the concentration post maps because they are commonly associated with other constituents such as benzene and toluene that did exceed GWPS values.

2.6.1 Background Monitor Wells - Groundwater Quality

The results of the 2013 semiannual groundwater analyses at background monitor wells WN-1A and WN-1B are presented on Tables 3 and 4. The data is also presented on concentration posting and isopleth maps, Figures 7 through 11, and on BTEX concentration trend graphs included in Appendix D.

May 2013

The laboratory results indicate that there were no detections of the four BTEX constituents or MTBE in background monitor wells WN-1A and WN-1B during the May 2013 semiannual sampling event (Table 3). These results are consistent with previous trends and confirm that the background monitor wells are indicative of background conditions.

October 2013

Background monitor wells WN-1A and WN-1B were analyzed for the full suite of GWPS constituents during the October 2013 semiannual sampling event (Table 4). None of the detected constituents exceeded their respective GWPS values.

2.6.2 Corrective Action Performance Monitor Wells – Groundwater Quality

The results from the 2013 semiannual groundwater sampling of the corrective action performance (CAP) monitor wells are presented on Tables 3 and 4. The data is also presented on isopleth and concentration posting maps, Figures 7 through 11, and on BTEX concentration trend graphs included in Appendix D.

May 2013

The groundwater sampling data indicate BTEX constituents were detected in three wells (WN-7B, WN-8B, and MW-6) during the May 2013 sampling event. These benzene concentrations observed in the groundwater samples from these wells ~~detections did not~~ exceeded ~~any~~ the GWPS values. No BTEX constituents were detected in wells WN-5B, WN-6A, WN-6B, MW-13, and MW-17 and there were no

MW-39C, MW-40C, RFI2-1C, RFI2-2D, RFI2-4C, RFI2-7C, and RFI2-8C) had concentrations detected at or above the GWPS for various constituents. These constituents included arsenic, benzene, 1,2-dichloroethane, toluene, 1,2,4-TMB, 1,3,5-TMB, benzo(a)anthracene, benzo(a)pyrene, benzo-(b)fluoranthene, 1-methylnapthalene, 2-methylnapthalene, naphthalene, phenanthrene and dibenz-(a,h)anthracene. Dibenz(a,h)anthracene was only detected above the GWPS in one monitor well (MW-23C) at a concentration of 0.21 µg/L. MTBE was only detected in one Part II monitor well (MW-28C) at a trace concentration of 7 µg/L. There were no detections of benzene in the groundwater samples from the monitor wells completed in the lower portion of the alluvial aquifer.

There were no detections of VOCs in the groundwater sampled in the Construction Debris Landfill (CDL) area east of the oxidation ponds. There were trace level detections of SVOCs and PAHs in the CDL area groundwater generally two or more orders of magnitude less than the GWPS.

Upgradient Boundary Well (Group I) Results

Upgradient boundary monitor wells consist of six RFI2 series wells: RFI2-9C, -10C, -11C, -12C, -13C, and -14C. There were no detections of benzene in the groundwater samples from these wells. All but monitor well RFI2-12C had no detections of the target VOCs. RFI2-12C had trace level detections of toluene and 1,2,4-trimethylbenzene. There were trace level detections of naphthalene in these monitor wells, however, RFI2-12C had low level detected concentrations of several SVOCs and PAHs.

Walnut River Boundary Well (Group II) Results

The Walnut River boundary wells include 13 RFI2 series wells from RFI2-1A to RFI2-8A/C. There were no detections of VOCs in 10 of these wells. Monitor wells RFI2-1C, -2D, and -4C contained low level detections of BTEX constituents with the exception of the sample from RFI2-2D which contained 23 µg/L benzene. As indicated on Table 4 and the group 2 analytes shown on Figure 11, there were several low level detections of SVOCs and PAH in these wells. Two of these wells, RFI2-1C~~2D,~~ and RFI2-2D~~4C~~ had 1-methylnaphthalene and 2-methylnaphthalene concentrations above the GWPS. Monitor well RFI2-4C contained 1-methylnaphthalene above the GWPS. Arsenic was detected with concentrations above the GWPS in monitor wells RFI2-7C and RFI2-8C. There were no other exceedances of the GWPS.

2.6.6 Groundwater Constituent Isopleth Maps

Three isopleth maps have been prepared using the Part I and Part II groundwater monitoring results for benzene, 1-methylnaphthalene, and naphthalene. These maps define the dissolved phase impacts across

4.0 EVALUATION OF ADEQUACY OF CORRECTIVE ACTION

This section is an evaluation of the overall adequacy of the corrective action program. It fulfills the reporting requirement of Section IV.E.1 in the facility RCRA Permit. Adequacy is demonstrated by the success of the corrective action systems in meeting their RCRA Permit objectives. There ~~are~~ currently ~~two~~ is one RCRA-permitted corrective action remedial system~~s~~ operating at the facility. The~~i~~s~~e~~ system~~s~~ and ~~their~~ its' respective Permit objectives are as follows:

Groundwater Recovery and Containment System: to achieve and sustain a reverse groundwater hydraulic gradient at the boundary between the WMA and the Walnut River. The head differential between each of the four pairs of capture zone monitor wells is to be, at a minimum, 0.2 feet; or, the GWPS must be met at the four compliance point monitor wells.

System efficiency is the combination of both achieving the above remedial objectives and operating optimally while doing so. Simply put, optimal operation facilitates the consistent success of a given system. To fulfill the reporting requirements of Section IV.E.1.a of the facility RCRA permit, this Section of the report evaluates the efficiency of the groundwater recovery and containment system in maintaining a reverse gradient ~~and the performance of the LTU corrective action system~~.

The section ends with the report's stated conclusions regarding the current adequacy of the corrective action program. These conclusions are based on the evaluation of the corrective action system~~s~~ presented in Sections 4.1 and 4.2.

4.1 Efficiency of the Groundwater Recovery and Containment System

This section evaluates the efficiency of the groundwater recovery and containment system with respect to groundwater gradient reversal, operational consistency, well hydraulic considerations, and maintenance requirements.

4.1.1 Achieving Gradient Reversal

Gradient reversal is demonstrated at four pairs of capture zone monitor wells CMW-01/RCRA-7, CMW-02/113, CMW-03/118, and CMW-04/MW-1002. These capture zone monitor wells were strategically located between recovery wells where the hydraulic gradients are at a minimum (see Figure 2). Capture zone monitor well pairs were monitored quarterly during 2013 in compliance with the permit. The

2013 Annual Groundwater Monitoring Report

Arkansas City, Kansas

Permit Number: KSD087418695

Prepared for:

MRP Properties Company, LLC
1400 South M Street
Arkansas City, Kansas 67005

Prepared By:

MWH Americas, Inc.
1801 California Street, Suite 2900
Denver, Colorado 80202

February 28, 2014
Revised July 14, 2014

PROJECT NUMBER: 10502425

1.0 INTRODUCTION

The Kansas Department of Health and Environment (KDHE) issued a RCRA post closure permit (Part I Permit) to MRP Properties Company, LLC (MRP) on September 28, 2012, which became effective on October 28, 2012 (KDHE, 2012). The Environmental Protection Agency (EPA) issued a HSWA Part II Permit (Part II Permit) to MRP also on September 28, 2012. The Part II Permit became effective on October 31, 2012. The Permit Part I conditions apply to the #1 and #2 Surface Impoundments and the #3A Aerated Lagoon which are undergoing post closure monitoring and the Land Treatment Unit (LTU) which is in the closure phase. The Part I Permit contains groundwater corrective action provisions and associated monitoring and reporting requirements. The Part II Permit requires groundwater monitoring to monitor the effectiveness of the Interim Corrective Measures.

The objective of this report is to provide a comprehensive evaluation of the Part I Permit groundwater monitoring and corrective action programs during 2013, and to fulfill the annual groundwater reporting requirements specified in the Permit Part I, Section IV.e.1. This report also presents the data associated with the Part II Permit groundwater monitoring program in 2013.

1.1 Background

MRP Properties Company, LLC (MRP) is the current owner of the site which is located southeast of Arkansas City, Kansas upstream of the confluence of the Arkansas and Walnut Rivers. Figure 1 shows the site location. Land use adjacent to the site is residential to the west, while northwest and southwest of the refinery the land use is mixed industrial, commercial and residential. Land use to the north and northeast side of the site across the Walnut River is agricultural, and the land south and east is part of the Kaw Wildlife Management Area and is used for hunting.

The site was formerly a petroleum refinery that was initially constructed in the 1920's and has had several different owners. Total Petroleum, Inc. (Total) was the last owner to operate the refinery. Total shut down the refining operations in 1996. An asphalt terminal continues to operate in the northern part of the site. The facility is comprised of the four regulated hazardous waste management units described above.

1.2 Waste Management Area Description

The four hazardous waste management units at the facility which are subject to corrective action, in accordance with 40 CFR 264.100, are identified as #1 Surface Impoundment, #2 Surface Impoundment,

#3A Aerated Lagoon, and the Land Treatment Unit (LTU). In accordance with 40 CFR 264.95(b)(2) and 264.97(b), the four hazardous waste management units have been incorporated into one Waste Management Area (WMA) for the purpose of groundwater monitoring and corrective action. The WMA, as shown on Figure 2, is defined as the area encompassing the Land Treatment Unit to the southwest and the #1 Surface Impoundment, #2 Surface Impoundment, and #3A Aerated Lagoon to the northeast extending to the Walnut River.

1.3 Corrective Action Program

The groundwater corrective action program for the WMA is designed to meet the applicable requirements of 40 CFR 264.100, as incorporated by reference in K.A.R. 28-31-264, and the RCRA Permit until corrective action requirements contained in 40 CFR Part 264 Subpart F and the Permit have been satisfied. The corrective action program for the WMA consists of a program to ensure that groundwater quality will achieve compliance with the groundwater protection standard (GWPS) established in Attachment B of the Part I Permit. The groundwater corrective action consists of continuous operation of the groundwater containment and recovery system at the downgradient boundary of the WMA. The groundwater recovery system will continue to operate until the groundwater protection standard (GWPS) values established in Permit Condition IV.B. have not been exceeded for a period of three consecutive years at and beyond the point of compliance [40 CFR 264.100 (c)].

The groundwater corrective action system consists of nine recovery wells (RW-35 through RW-75). The recovery wells are used to achieve a groundwater gradient reversal to contain the groundwater and prevent releases to the Walnut River. The recovery wells pump the groundwater to the facility's wastewater treatment system (i.e., bioreactor tanks and oxidation ponds) for treatment prior to discharge to the Walnut River under Kansas Water Pollution Control (KWPC) permit number I-WA18-PO02 (KDHE, 2011).

This report consists of five sections and four appendices (Appendices A through D). This introduction is Section 1. Section 2 presents a description of the groundwater monitoring network and the monitoring parameters, sampling protocols and laboratory results for the Part I and Part II permit related monitoring. Section 3 provides an evaluation of the effectiveness of the corrective action. Section 4 provides an evaluation of the adequacy and efficiency of the corrective action. Section 5 of the report contains a list of references used in the report.

2.0 GROUNDWATER MONITORING PROGRAM

This section presents a summary of the relevant groundwater information collected in 2013 associated with the Part I and Part II permits. As outlined by the permit, this information is presented in the following narrative. Pertinent information is also presented in tabular and graphical formats.

2.1 Part I Permit Corrective Action Monitoring Program Monitor Well Network

The corrective action monitoring program (CAMP) groundwater monitoring well network is comprised of two background monitoring wells (Background), eight corrective action performance (CAP) monitoring wells and two supplemental wells (SUPP), listed on Table 1. Table 1 also includes the eight groundwater capture zone monitoring wells (CPZ), four of which are also the point of compliance wells located downgradient of the WMA. The CAMP and capture zone monitoring wells were resurveyed April 10, 2013, by Smith & Oakes, Inc., of Arkansas City, KS, in accordance with Section 4.3 of the groundwater sampling and analysis plan (Part B Permit Appendix P). The survey and well construction information for these wells is also included on Table 1. The monitor well construction diagrams for each of the monitor wells are included in Appendix A. Figure 2 shows the corrective action groundwater monitoring well network including the four Point of Compliance wells (CMW-01, CMW-02, CMW-03, and CMW-04). The eight CAP monitoring wells are designed to monitor groundwater quality in the uppermost (alluvial aquifer) groundwater zone upgradient and within the WMA.

2.1.1 Groundwater Monitoring

The CAMP has two elements: groundwater quality testing and groundwater capture zone monitoring. The CAMP is designed to meet the requirements of CFR 264.100 and to verify the effectiveness of the corrective action and to monitor the progress of the cleanup effort towards achieving the cleanup goals within the WMA. The water quality testing is used to monitor the progress and effectiveness of the corrective action, and the groundwater capture zone monitoring is used to monitor the effectiveness of the recovery system in preventing releases to the Walnut River.

2.1.2 Background Monitoring Wells

Two wells, WN-1A and WN-1B, monitor the groundwater at the upgradient side of the WMA (Figure 2). Monitor well WN-1A is screened in the lower part of the aquifer (lower), and monitor well WN-1B is screened across the water table in the upper part (upper) of the aquifer.

2.1.3 Corrective Action Performance Monitoring Wells

Eight wells monitor the groundwater within the WMA. These wells are located at the LTU and between the LTU and the groundwater corrective action wells at the downgradient side of the WMA. The performance monitoring well network consists of four single well locations: WN-5B, WN-7B, WN-8B, MW-17, and two well nests consisting of two monitor wells per nest: WN-6A / WN-6B and MW-6 / MW-13. Monitor wells WN-6A and MW-13 are screened in the lower part of the alluvial aquifer, and monitor wells WN-5B, WN-6B, WN-7B, WN-8B, MW-6, and MW-17 are completed in the upper part of the alluvial aquifer with the well screen intersecting the water table.

2.1.4 Supplemental Information Monitoring Wells

The RCRA permit identifies monitor wells MW-12 and RCRA-4 as supplemental monitoring wells. Monitor well MW-12 was completed with screen in the lower part of the alluvial aquifer, and monitor well RCRA-4 is completed in the upper part of the alluvial aquifer with the well screen intersecting the water table.

2.1.5 Bioreactor Influent Sampling

Groundwater monitoring is also performed at the inlet to the facility's wastewater treatment system. Water samples are collected quarterly from the bioreactor tank influent lines.

2.1.6 Capture Zone Monitoring Wells

The capture zone monitoring network consists of eight groundwater monitor wells located at the downgradient side of the WMA (Figure 2). The capture zone monitoring wells consist of monitor wells CMW-01, CMW-02, CMW-03 and CMW-04 located at the edge of the WMA boundary adjacent to the Walnut River, and monitor wells RCRA-7, 113, 118, and MW-1002 located within the line of groundwater recovery wells approximately parallel to the downgradient side of the WMA. The capture zone monitoring wells are designed to demonstrate the hydraulic gradient reversal between the recovery wells and the Walnut River. Each of these capture zone monitoring wells is constructed with the screened interval located below the water table.

2.2 Part II Monitoring Program

The Part II Permit monitoring program consists of 43 monitor wells listed on Table 1. The monitoring network is comprised of 21 existing monitor wells and 22 monitor wells that were installed between

September 25 and October 9, 2013 according to Addendum No. 1 (MWH, 2013a) to the approved Part I Permit groundwater sampling and analysis plan (SAP). Nine of the Part II Permit monitor wells are completed in the lower part of the alluvial aquifer, the remaining 34 monitor wells are completed in the upper part of the aquifer. The Part II monitor wells are organized into three groups, I, II, and III. The Group I wells are located along the upgradient site property boundary. The Group II wells are associated with the Walnut River boundary of the site, and the Group III wells are located across the interior of the site.

The locations and top of casing elevations for all of the Part II Permit monitor wells were surveyed on November 20, 2013 by Smith & Oakes, Inc., of Arkansas City, KS, in accordance with Section 4.3 of the groundwater sampling and analysis plan (Part B Permit Appendix P). The survey and well construction information for these wells is also included on Table 1. The monitor well construction diagrams for each of the monitor wells are included in Appendix A. Figure 2 shows the locations of the Part II Permit groundwater monitor wells.

2.2.1 Groundwater Monitoring

The Part II Permit groundwater monitoring is designed to monitor the effectiveness of the interim corrective measures as required by Part II Permit Section III.D.5.c.

2.3 Analyte List

The Part I permit requirements include quarterly sampling of the bioreactor influent water for benzene, toluene, ethylbenzene, and total xylenes (BTEX). The Part I permit also requires sampling the background, corrective action performance, and supplemental information monitor wells semiannually and testing for BTEX and every three years testing for the monitor wells for the complete GWPS analyte list of inorganic, volatile organic compound (VOC), and semi-volatile organic compound (SVOC) constituents, as summarized in Table 2.

MRP has added MTBE to the BTEX analyte list for the bioreactor and semiannual monitor well samples. The second 2013 semiannual sampling event occurred on the three year monitoring cycle; consequently, the second 2013 semiannual Part I groundwater sampling involved the full GWPS list of analytes.

The Part II permit monitoring event conducted during the second semiannual 2013 sampling period involved the full GWPS (Table 2) analyte list to coincide with the second semiannual 2013 Part I monitoring event.

2.4 Sampling Schedule

The quarterly bioreactor influent sampling events, conducted on March 7, May 9, July 18, and October 28, 2013. The first semiannual groundwater sampling event was conducted between May 7 and 9, 2013 and the second semiannual sampling event was conducted between October 15 and 28, 2013. The second semiannual sampling event included the Part I and Part II permit wells.

2.5 Groundwater Sampling Protocol

The groundwater monitoring was conducted in accordance with the procedures in the approved Groundwater Sampling and Analysis Plan (RCRA Part B Permit Application Appendix P, MWH 2011a and 2013).

2.6 Groundwater Sampling Results

The groundwater sampling data is summarized on the groundwater results Tables 3 and 4, for the May and October 2013 semiannual events, respectively. The 2013 site-wide quarterly groundwater level gauging was conducted on March 7, May 6, July 2, and October 1. The quarterly site-wide groundwater level gauging data are tabulated on Table 5. Groundwater potentiometric surface contour maps for each quarterly groundwater level monitoring event are presented on Figures 3, 4, 5, and 6. Further discussion and analysis of the data is included in Section 3 of this report.

Quarterly bioreactor treatment system influent sampling was conducted on March 7, May 9, July 18, and October 28, 2013. The laboratory results of the quarterly influent samples are summarized on Table 6. The laboratory reports, groundwater sampling field forms and chain-of-custody forms are included in Appendix B. Laboratory analytical data validation information is summarized in Appendix C. A time versus concentration trend graph for the bioreactor influent flow-weighted average BTEX concentrations is included in Appendix D.

The groundwater laboratory analytical results are presented on concentration isopleth and data posting maps, Figures 7 through 11 and on BTEX concentration trend graphs included in Appendix D. The data from the October 2013 sampling event are presented on isopleth and concentration posting maps.

Benzene, naphthalene, and 1-methylnapthalene concentration data are presented on concentration isopleth maps (Figures 7 through 9). Additionally, representative constituents were selected for presentation on the concentration posting maps, Figures 10 and 11. Ethylbenzene and total xylenes did not exceed GWPS values in any of the groundwater samples collected during the two 2013 sampling events, but they were included on the concentration post maps because they are commonly associated with other constituents such as benzene and toluene that did exceed GWPS values.

2.6.1 Background Monitor Wells - Groundwater Quality

The results of the 2013 semiannual groundwater analyses at background monitor wells WN-1A and WN-1B are presented on Tables 3 and 4. The data is also presented on concentration posting and isopleth maps, Figures 7 through 11, and on BTEX concentration trend graphs included in Appendix D.

May 2013

The laboratory results indicate that there were no detections of the four BTEX constituents or MTBE in background monitor wells WN-1A and WN-1B during the May 2013 semiannual sampling event (Table 3). These results are consistent with previous trends and confirm that the background monitor wells are indicative of background conditions.

October 2013

Background monitor wells WN-1A and WN-1B were analyzed for the full suite of GWPS constituents during the October 2013 semiannual sampling event (Table 4). None of the detected constituents exceeded their respective GWPS values.

2.6.2 Corrective Action Performance Monitor Wells – Groundwater Quality

The results from the 2013 semiannual groundwater sampling of the corrective action performance (CAP) monitor wells are presented on Tables 3 and 4. The data is also presented on isopleth and concentration posting maps, Figures 7 through 11, and on BTEX concentration trend graphs included in Appendix D.

May 2013

The groundwater sampling data indicate BTEX constituents were detected in three wells (WN-7B, WN-8B, and MW-6) during the May 2013 sampling event. The benzene concentrations observed in the groundwater samples from these wells exceeded the GWPS values. No BTEX constituents were detected in wells WN-5B, WN-6A, WN-6B, MW-13, and MW-17 and there were no detections of MTBE in the

corrective action performance monitor wells during the May 2013 semiannual sampling event.

October 2013

CAP monitor wells were analyzed for the full suite of GWPS constituents during the October 2013 semiannual sampling event (Table 4). Four (MW-6, WN-5B, WN-7B, and WN-8B) of the eight CAP monitor wells sampled had concentrations detected at or above the GWPS for at least one constituent. These constituents included arsenic, benzene, 1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-trimethylbenzene (1,3,5-TMB), 1-methylnapthalene, 2-methlynapthalene, and naphthalene. There were no detections of MTBE, beryllium, cadmium, selenium, and silver in the CAP monitor wells during the October 2013 semiannual sampling event.

2.6.3 Supplemental Information Monitor Wells – Groundwater Quality

Monitor wells MW-12 and RCRA-4 comprise the supplemental information monitoring program. The results of the laboratory analyses for the May 2013 and October 2013 sampling events are summarized on Tables 3 and 4, respectively. The data is also presented on isopleth and concentration posting maps, Figures 7 through 11, and on BTEX concentration trend graphs included in Appendix D. The laboratory results indicate that there were no detections of the four BTEX constituents or MTBE in monitor wells MW-12 and RCRA-4 during both the May and October 2013 semiannual sampling events. During the October 2013 semiannual sampling event several inorganic, VOC, and SVOC constituents were detected at low concentrations in the groundwater sample from monitor well MW-12; however, none of these detections exceeded a GWPS value (Table 4).

The groundwater sample collected from monitor well RCRA-4 had no detections of VOCs and one SVOC estimated trace level concentration for pyrene; several orders of magnitude less than the GWPS. There were no detections of MTBE, beryllium, cadmium, selenium, and silver in the Supplemental Information monitor wells during the October 2013 semiannual sampling event.

2.6.4 Bioreactor Influent Sampling – Groundwater Quality

The quarterly bioreactor influent water analytical results are presented on Table 6. Bioreactor effluent samples are also collected quarterly; the results are presented on Table 6. Bioreactor influent samples were collected quarterly from three influent locations during 2013. The sample identified as BIO-INF-A, was collected from the East bioreactor influent line after combining flow from the East and West lines (located at the north side of the bioreactor tank), which carry water from the RW series (RW-11 through

RW-75) recovery wells. Two additional water samples were collected, one from the north area influent line, BIO-INF-B (located at the east side of the bioreactor tank), and a third sample was collected from BIO-INF-C located at the lift station near product recovery vessel V-7106. The BIO-INF-B and BIO-INF-C sampling points serve the interim measure (MWH, 2013b) product recovery system wells operated under the Permit Part II. Table 6 provides the individual sample results as well as a flow-weighted average concentration for the bioreactor influent water.

The flow-weighted average benzene concentrations in the bioreactor influent water (all wells) ranged from 1.2 µg/L to 3.0 µg/L in 2013. The groundwater from recovery wells RW-35 through RW-75 (BIO-INF-A) represented approximately 81 percent of the total bioreactor system influent flow in 2013. The benzene concentration in the BIO-INF-A samples in 2013 ranged from 0.79 J µg/L to 2.7 µg/L

The flow-weighted average concentrations for toluene, ethylbenzene, and total xylenes in the quarterly bioreactor influent samples were all at trace levels (less than or equal to 2.7µg/L) or nondetect. MTBE was not detected in any of the 2013 bioreactor influent samples collected. The performance of the treatment system is discussed in Section 3.4.

There were no detections of toluene, ethylbenzene, total xylenes, and MTBE in the quarterly water samples of the bioreactor effluent during 2013. Benzene concentrations were all at trace levels in the quarterly bioreactor effluent samples, ranging from 0.16J µg/L (estimated) to 0.6J µg/L (estimated).

2.6.5 Part II Monitor Wells – Groundwater Quality

The Part II Permit monitoring program includes 43 monitor wells. These wells were sampled for the first time during the October 2013 semiannual monitoring event. The results of the laboratory analyses for the October 2013 sampling events are summarized on Table 4. The data is also presented on isopleth and concentration posting maps, Figures 7 through 11, and on BTEX concentration trend graphs included in Appendix D. The laboratory analytical reports, field sampling forms, and log book entries are included in Appendix B.

The Part II monitor wells were analyzed for the full suite of GWPS constituents during the October 2013 semiannual sampling event (Table 4). Of the 43 Part II monitor wells sampled 19 (MW-20C, MW-22C, MW-23, MW-27C, MW-28C, MW-29C, MW-30C, MW-34C, MW-35C, MW-36C, MW-37C, MW-38C, MW-39C, MW-40C, RFI2-1C, RFI2-2D, RFI2-4C, RFI2-7C, and RFI2-8C) had concentrations detected

at or above the GWPS for various constituents. These constituents included arsenic, benzene, 1,2-dichloroethane, toluene, 1,2,4-TMB, 1,3,5-TMB, benzo(a)anthracene, benzo(a)pyrene, benzo-(b)fluoranthene, 1-methylnapthalene, 2-methylnapthalene, naphthalene, phenanthrene and dibenz-(a,h)anthracene. Dibenz(a,h)anthracene was only detected above the GWPS in one monitor well (MW-23C) at a concentration of 0.21 µg/L. MTBE was only detected in one Part II monitor well (MW-28C) at a trace concentration of 7 µg/L. There were no detections of benzene in the groundwater samples from the monitor wells completed in the lower portion of the alluvial aquifer.

There were no detections of VOCs in the groundwater sampled in the Construction Debris Landfill (CDL) area east of the oxidation ponds. There were trace level detections of SVOCs and PAHs in the CDL area groundwater generally two or more orders of magnitude less than the GWPS.

Upgradient Boundary Well (Group I) Results

Upgradient boundary monitor wells consist of six RFI2 series wells: RFI2-9C, -10C, -11C, -12C, -13C, and -14C. There were no detections of benzene in the groundwater samples from these wells. All but monitor well RFI2-12C had no detections of the target VOCs. RFI2-12C had trace level detections of toluene and 1,2,4-trimethylbenzene. There were trace level detections of naphthalene in these monitor wells, however, RFI2-12C had low level detected concentrations of several SVOCs and PAHs.

Walnut River Boundary Well (Group II) Results

The Walnut River boundary wells include 13 RFI2 series wells from RFI2-1A to RFI2-8A/C. There were no detections of VOCs in 10 of these wells. Monitor wells RFI2-1C, -2D, and -4C contained low level detections of BTEX constituents with the exception of the sample from RFI2-2D which contained 23 µg/L benzene. As indicated on Table 4 and the group 2 analytes shown on Figure 11, there were several low level detections of SVOCs and PAH in these wells. Two of these wells, RFI2-1C and RFI2-2D had 1-methylnaphthalene and 2-methylnaphthalene concentrations above the GWPS. Monitor well RFI2-4C contained 1-methylnaphthalene above the GWPS. Arsenic was detected with concentrations above the GWPS in monitor wells RFI2-7C and RFI2-8C. There were no other exceedances of the GWPS.

2.6.6 Groundwater Constituent Isopleth Maps

Three isopleth maps have been prepared using the Part I and Part II groundwater monitoring results for benzene, 1-methylnaphthalene, and naphthalene. These maps define the dissolved phase impacts across the site in the upper part of the alluvial aquifer. As discussed previously, the lower part of the alluvial

aquifer is relatively unimpacted.

The benzene, 1-methylnaphthalene, and naphthalene isopleth maps are shown on Figures 7, 8, and 9, respectively. The isopleth maps show the contours down to the respective GWPS values; groundwater impacts outside the contoured region is below the GWPS and the results are generally non-detect or at trace concentrations.

The three isopleth contour maps are generally confined to the same areas at the site and generally reflect the LNAPL extent observed through the site-wide groundwater monitoring program. The highest dissolved phase benzene concentrations are observed at monitor wells MW-22C and MW-23C at the west side of the site in the vicinity of former above ground storage tanks (ASTs) 132 and 133. Historically, these tanks were used to store unleaded gasoline. A release of gasoline was reported at tank 133 (west of MW-23C) in 1986 (Part B, MWH 2011) and is considered the source of the dissolved phase benzene plume. Lower concentration dissolved phase benzene impacts are observed in the groundwater in the northern part of the site. Similar results are observed for the dissolved phase concentrations 1-methylnaphthalene and naphthalene. The relative extents of these dissolved phase plumes reflect the variation in the biodegradation rates. For example, naphthalene is more readily biodegraded than 1-methylnaphthalene in groundwater, consequently we see a much reduced dissolved phase naphthalene impacted area.

4.0 EVALUATION OF ADEQUACY OF CORRECTIVE ACTION

This section is an evaluation of the overall adequacy of the corrective action program. It fulfills the reporting requirement of Section IV.E.1 in the facility RCRA Permit. Adequacy is demonstrated by the success of the corrective action systems in meeting their RCRA Permit objectives. There currently is one RCRA-permitted corrective action remedial system operating at the facility. This system and its' respective Permit objectives are as follows:

Groundwater Recovery and Containment System: to achieve and sustain a reverse groundwater hydraulic gradient at the boundary between the WMA and the Walnut River. The head differential between each of the four pairs of capture zone monitor wells is to be, at a minimum, 0.2 feet; or, the GWPS must be met at the four compliance point monitor wells.

System efficiency is the combination of both achieving the above remedial objectives and operating optimally while doing so. Simply put, optimal operation facilitates the consistent success of a given system. To fulfill the reporting requirements of Section IV.E.1.a of the facility RCRA permit, this Section of the report evaluates the efficiency of the groundwater recovery and containment system in maintaining a reverse gradient.

The section ends with the report's stated conclusions regarding the current adequacy of the corrective action program. These conclusions are based on the evaluation of the corrective action system presented in Sections 4.1 and 4.2.

4.1 Efficiency of the Groundwater Recovery and Containment System

This section evaluates the efficiency of the groundwater recovery and containment system with respect to groundwater gradient reversal, operational consistency, well hydraulic considerations, and maintenance requirements.

4.1.1 Achieving Gradient Reversal

Gradient reversal is demonstrated at four pairs of capture zone monitor wells CMW-01/RCRA-7, CMW-02/113, CMW-03/118, and CMW-04/MW-1002. These capture zone monitor wells were strategically located between recovery wells where the hydraulic gradients are at a minimum (see Figure 2). Capture zone monitor well pairs were monitored quarterly during 2013 in compliance with the permit. The

quarterly groundwater level monitor data from the eight capture zone monitor wells are presented on Table 12. The corresponding groundwater gradient monitoring measurement field forms are included in Appendix B. The groundwater level elevation differences in 2013 at capture zone monitor well pair CMW-01/RCRA-7 ranged from 0.24 to 0.73 feet, at CMW-02/113 ranged from 0.40 to 00.71 feet, at CMW-03/118 ranged from 0.46 to 0.97 feet, and at CMW-04/MW-1002 ranged from 0.25 to 0.39 feet. The data demonstrate the Permit required head differences were achieved.

4.1.2 Operational Consistency

This discussion focuses on recovery wells RW-35 through RW-75 located downgradient of the WMA boundary. Groundwater pumping rate data for each recovery well in 2013 are presented on Figure 13 for RW-35, RW-40, RW-45, RW-50, and RW-55, and on Figure 14 for RW-60, RW-65, RW-70, and RW-75. The combined groundwater pumping rate for WMA recovery wells RW-35 through RW-75 is presented on Figure 15. The groundwater pumping rate graph on Figure 15 includes the pumping rates from the interim measure product recovery wells. The graphs on Figures 13 and 14 include the monthly depth to product and depth to water data. Generally speaking, the depth to water (pumping level) in the well is proportional to the groundwater pumping rate. That is, as the groundwater pumping rate is increased the depth to the groundwater pumping level increases and conversely as the pumping rate is decreased, the pumping water level in the well recovers (depth to water decreases). Other factors will affect this general relationship. These factors include regional groundwater table elevation changes and the efficiency of the recovery well.

Monitor well #17 provides a reference to indicate groundwater level fluctuations at the site over time because of its relatively central location within the site. Groundwater level data from this well are included on Figure 12 for comparison with the Walnut River flow and stage data for the period 2003 through 2013, and Arkansas City precipitation data for the period 2008 through 2013. The monitor well #17 groundwater level data and Walnut River flow and stage data correlate fairly closely as would be expected due to the hydraulic connection between the alluvial aquifer and the Walnut River. The groundwater level fluctuations, corrected for free product, at monitor well #17 varied by approximately 5.73 feet during 2013 compared to 1.8 feet in 2012. The increased range in groundwater level fluctuations in 2013 corresponds to the increased flow and stage observed in the Walnut River during July and August 2013.

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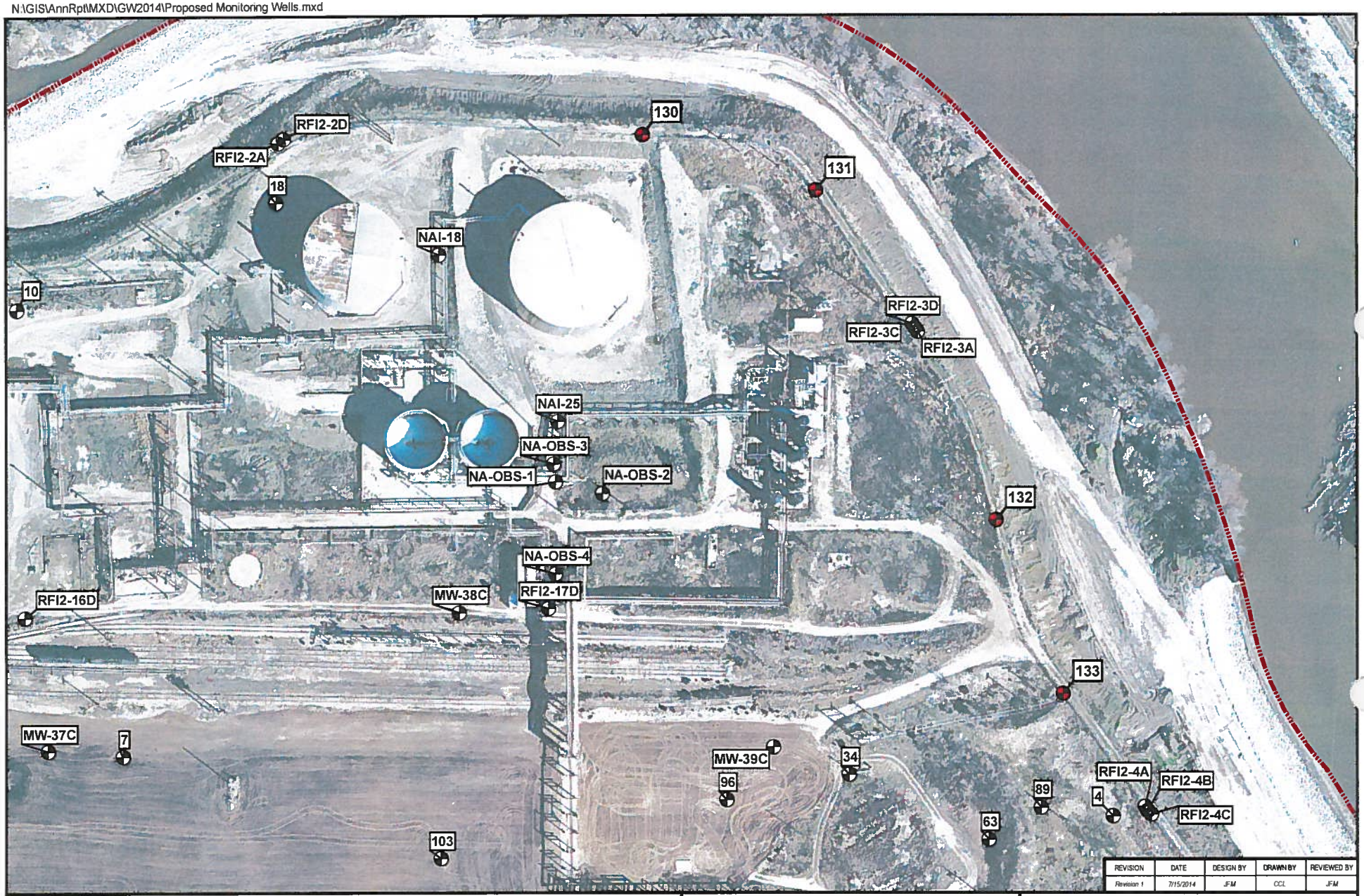

REVISION	DATE	DESIGN BY	DRAWN BY	REVIEWED BY
Revision 1	7/15/2014	JFM	CCL	JFM

EXPLANATION

- SITE PROPERTY BOUNDARY (APPROXIMATE)
- PROPOSED MONITORING WELLS
- EXISTING MONITORING WELLS

N
W E
S

SCALE IN FEET

0 100 200

AERIAL PHOTO: MARCH 12, 2005

TITLE:

PROPOSED MONITORING WELLS LOCATION MAP

PROJECT:

MRP PROPERTIES COMPANY, LLC
ARKANSAS CITY, KANSAS

MWH

FIGURE No.:

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